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October 2001

South Korea

The Republic of Korea (South Korea) is important to world energy markets as the fourth largest oil importer, and the second largest importer of Liquefied Natural Gas (LNG).

Note: Information contained in this report is the best available as of October 2001 and can change.



GENERAL BACKGROUND

After making a strong recovery in 1999-2000 from the effects of the Asian financial crisis in 1997-1998, South Korea's economy has been negatively affected by the global economic slowdown of 2001. Exports of manufactured goods have fallen, and overall manufacturing output in the first six months of 2001 fell by 1.9%. Growth in real gross domestic product (GDP) is projected at 2.2% for 2001, down from 8.8% in 2000 and 10.7% in 1999. Real GDP growth is projected to recover to 3.1% in 2002.

South Korea has begun an economic reform program designed to address some of the conditions which made its economy vulnerable to the shock of the Asian financial crisis. Most importantly, the South Korean government has begun to break the hold of the chaebols (large,

multi-industry conglomerates) over the financial sector. The lack of an "arms length" business relationship between borrowers and lenders had led to many South Korean financial institutions having a very large ratio of non-performing loans. While there is no intention of forcing the chaebols to divest their financial subsidiaries, the government is increasing regulation to prevent chaebols from arbitrarily channeling money into other subsidiaries. Chaebols also have been pressed to spin off their non-core businesses and to rationalize their corporate structures. To stimulate domestic demand, the South Korean government under President Kim Dae-jung enacted a package of tax cuts directed at lower and middle-income workers. The reform process has proceeded at a somewhat slower pace than originally planned, and much of the

restructuring has yet to be accomplished.

The South Korean government also has plans to privatize several large state-owned enterprises (SOEs), including the state utility, Korean Electric Power Corporation (KEPCO). The privatization program has moved at a slower pace than originally planned, due in part to the question of how much foreign ownership should be allowed and strong opposition from labor unions to some of the privatizations, particularly that of KEPCO. The breakup of KEPCO's generation assets into six separate companies took place in April 2001.

South Korea recently joined the International Energy Agency (IEA). Its membership became effective in April 2001, upon its fulfillment of the requirements for membership.

OIL

With no domestic reserves, South Korea must import all of its crude oil. Oil makes up the largest share of South Korea's total energy consumption, though its share has been declining in recent years. Petroleum accounted for 58% of primary energy consumption in 1999. South Korea consumed slightly more than 2.0 million barrels a day of oil (bbl/d) in 1999, down from a high of 2.4 million bbl/d in 1997, all of which was imported. South Korea is the sixth largest oil consumer and fourth largest crude oil importer in the world.

South Korea's total reliance on oil imports has led to a policy of securing and diversifying the country's oil supply. South Korea has both a short-term and a long-term approach to fulfilling its oil needs. In the short-term, it has developed a strategic petroleum reserve, which is managed by the state-owned Korea National Oil Corporation (KNOC). Strategic stocks are roughly equivalent to a 90-day supply, and are expanded in proportion to consumption levels. The period of "import cover" was expanded from 60 days in early 2001, in part to meet the requirements for entry into the IEA. This reserve serves as a safety net against supply disruptions.

In the long-term, KNOC is pursuing equity stakes in oil and gas exploration around the world. KNOC has 19 overseas exploration and production projects in 12 countries. This includes 4 producing fields in Yemen, Argentina, Peru, and the North Sea, 2 fields under development in Yemen and Venezuela, and 13 overseas exploration projects. KNOC also is exploring domestic blocks offshore from South Korea. KNOC reported a new oil find in August 2001 at the Vung Tau site offshore from Vietnam, which is expected to be developed and in production by 2003. Recoverable reserves at Vung Tau are estimated at 420 million barrels. The South Korean government has stated that it plans for KNOC to provide for 10% of the country's oil needs by 2010.

The South Korean refining industry was strongly affected by the country's economic crisis in 1997-1998, especially because it already suffered from significant overcapacity before the downturn in demand. In September 1998, South Korea's four downstream oil companies raised the retail price of gasoline and diesel oil following a government tax hike. In October 1998, the South Korean government, under financial pressure, decided to fully deregulate the refining industry, accelerating this decision from the original January 1999 deadline in order to attract badly needed foreign investment. Foreign backing has proved critical in maintaining cash flows and preserving the creditworthiness of the refining industry.

Several corporate consolidations and selloffs occurred as a result. In September 1998, Hanwha's 270,000 bbl/d refinery in Incheon was taken over by Hyundai Oil Refinery Company, giving Hyundai the country's third largest refining capacity (after SK Corporation and LG-Caltex) with 580,000 bbl/d. In October 1999, Hyundai completed the sale of a 50% interest in its refining operation to the Abu Dhabi International Petroleum Investment Corporation, which was intended to reduce the company's highly leveraged debt-to-equity ratio.

Ssangyong Group sold its 28.4% stake in Ssangyong Oil Refining Corporation to its majority shareholder, Saudi Aramco, in 2000. The firm's name was changed to S-Oil.

Despite the consolidation in South Korea's refining sector, it has yet to fully recover from the effects of the Asian financial crisis and the shock of the 1998 deregulation. The South Korean refiners were still not profitable as of mid-2001.

NATURAL GAS

South Korea currently relies on imported liquefied natural gas (LNG) to meet its entire demand for natural gas, though a project currently under development will make South Korea a minor gas producer by early 2003. Imports of LNG began in 1986, after the founding of the state-owned monopoly LNG importer Korea Gas Company (Kogas). South Korea currently gets most of its LNG from Indonesia and Malaysia, with smaller volumes from Brunei, Qatar, and Oman. The supplies from Qatar began in August 1999, under a contract with Qatar's new Ras Laffan LNG (RasGas) venture. The first shipment of Omani LNG was loaded in April 2000. In 1999, natural gas comprised around 9% of South Korea's primary energy consumption. South Korea is the second largest importer of LNG worldwide, importing 596 billion cubic feet (Bcf) of LNG in 1999. South Korea's annual LNG imports increased by 140% between 1993 and 1997, but fell by 9% in 1998 due to the effects of the Asian financial crisis. In 1999, however, South Korea's LNG imports grew by 22%, as its economy recovered and new supplies from Qatar came onstream. South Korean natural gas demand is split almost evenly between the electricity sector and the residential heating sector.

Despite the temporary downturn, Kogas is planning to push ahead with projects for the expansion of LNG receiving terminals. South Korea is increasing capacity at its existing terminals (Pyongtaek and Incheon). Also, Mitsubishi Corporation of Japan and Pohang Iron and Steel Corporation signed a letter of intent in October 1998 to build an LNG receiving terminal in South Korea at Kangnung. Current plans call for it to be completed in 2005.

The South Korean government announced in 1999 that it intends to privatize Kogas. An initial public offering of 33% of Kogas equity was carried out in December 1999. Privatization plans initially stalled, however, due to questions about the structure of the companies which would result if Kogas were split up for privatization. South Korea's Ministry of Commerce, Energy, and Industry (MOCIE) announced in September 2001, however, that it intends to proceed with the privatization as originally planned. Kogas will be separated into three corporations by the end of 2001. The two corporations dealing with imports and wholesale marketing will be auctioned off in the second half of 2002.

In addition to LNG imports, South Korea will have a small amount of domestic natural gas production starting in 2003. KNOC's \$320-million Donghae-1 development project, which is developing a gas deposit offshore from Ulchin in southeastern South Korea estimated to contain 200 Bcf of gas. Donghae-1 is a relatively minor development, however, and will satisfy only about 2% of South Korea's gas demand once it comes onstream.

Enron announced in December 1998 that it will be investing \$450 million in a joint venture with SK Corporation which will build expanded gas infrastructure in five South Korean cities. SK Corporation will contribute its existing stakes in city gas companies in the five cities to the joint venture, while Enron is providing the infusion of capital.

Meanwhile, South Korea also is exploring the possibility of a gas pipeline from the Kovykta gas deposit in the Irkutsk region of Eastern Siberia. The pipeline would supply China as well as South Korea, and might run through North Korea. The project as currently envisioned would supply about 1 Bcf/d each to South Korea, and a larger volume to China, possibly beginning around the end of the decade. The two Koreas agreed in September 2001 to conduct a joint feasibility study of the pipeline project.

COAL

Coal supplies about 20% of South Korea's total energy requirements. Most of this coal is imported, since the only indigenous coal resources consist of low-quality anthracite used in home heating and small boilers. Bituminous coal supplies (steam coal for power plants and industrial boilers and metallurgical coal for steelmaking) come mainly from Australia, with the United States and China also among the suppliers. State

power company KEPCO has invested in several Australian coal mines.

ELECTRIC POWER

South Korea uses a combination of thermal (oil, gas, and coal), nuclear, and hydroelectric capacity to meet its demand for electric power. Total power generation capacity was 46.4 gigawatts (GW) as of the beginning of 1999. The South Korean government estimates that its electricity demand will rise at an average annual rate of 4.3% per year through 2015.

In September 1998, KEPCO officially dedicated its Ulchin Number 3 nuclear reactor and launched the construction of Ulchin Nuclear Power Plants Numbers 5 and 6. Ulchin Number 3 has a generating capacity of 1 GW and is the first nuclear power plant built completely with South Korean technology from design to construction. The Number 4 Ulchin nuclear plant was completed in late 1999, and Numbers 5 and 6 are targeted to be completed in 2004 and 2005.

The South Korean government is moving ahead with plans to break up and privatize KEPCO. The South Korean government plans to split KEPCO into separate generation, transmission, and distribution units. In early 2001, KEPCO split its power generation holdings into six separate subsidiaries, in a preliminary move to facilitate a split into competing companies. Five of the six operate thermal and hydroelectric facilities and are of roughly equal size in terms of installed generating capacity - between 7 and 8 GW. The sixth is comprised of all of KEPCO's nuclear plants, which will be kept together in one corporation, which will remain under government ownership. The privatization plan has been controversial, with unions fearing layoffs by new management and some politicians opposing foreign ownership. Current plans call for the sale of the five non-nuclear generation companies to take place in early 2002. Options for the privatization of KEPCO's retail distribution operations currently are under study.

While most of South Korea's generating capacity is still controlled by KEPCO, a few independent power producers (IPPs) exist. LG Power, owned by the LG Group conglomerate, operates a 540-megawatt (MW) independent power plant at Bugok near Asan Bay. The facility began operation in April 2001. LG Power purchased the existing Anyang and Puchon plants in June 2000, with a combined capacity of 950 MW, from KEPCO after a competitive tender. Tractebel is also investing in a new 519-MW IPP plant in Yulchon in partnership with Hyundai. In another significant development, South Korea's original IPP, Hanwha Energy was spun off from its chaebol parent company in June 2000, in a deal in which El Paso Energy acquired a 50% stake. Hanwha Energy operates a 1,800-MW plant at Inchon.

While South Korea is not a party to the Kyoto Protocol on greenhouse gas emissions, and does not intend to become one, its future plans emphasize the development of more nuclear power plants to reduce growth in carbon emissions. A dozen additional nuclear plants are planned before 2015.

ENVIRONMENT

For years, South Korea was one of Asia's fastest growing, most successful economies. This rapid industrialization and growth in income, however, has had environmental impacts. Car ownership, for example, has increased significantly. Transboundary [pollution](#) is also a concern in the region and has led to the formation of a joint commission of environmental ministers from South Korea, China and Japan to tackle the problem.

Over the past two decades, total [energy](#) consumption and [carbon](#) emissions have increased in South Korea. In 1999, South Korea consumed 7.4 quadrillion Btu's of energy and emitted 107.5 million metric tons of carbon. [Energy intensity](#) (energy consumption per \$1990 of GDP) increased from 16.0 thousand Btu per \$1990 in 1980 to 17.3 thousand Btu per \$1990 in 1999, while [per capita](#) energy use increased over 3-fold, from 44.0 million Btu per person in 1980 to 156.8 million Btu per person in 1999.

Because increasing total production was South Korea's primary energy goal during its period of rapid industrialization, there was little focus on the development of [renewable](#) energy resources. However, as the price of fossil fuel imports in South Korea rose in 1999 and 2000, attention turned to the importance of

diversifying the energy mix. One of South Korea's goals for the [21st century](#), expanded in its National Vision for Environmental Policies in the 21st Century, is the promotion of green development schemes, such as increased usage of photovoltaic power and fuel cells.

Sources for this report include: Asia Pulse; Asian Wall Street Journal; CIA World Factbook 2001; Dow Jones News Wire service; Economist Intelligence Unit ViewsWire; FT Energy - Power in Asia; Korea Economic Weekly; Korea Herald; Korea Times; U.S. Energy Information Administration; Petroleum Intelligence Weekly; Reuters News Wire; WEFA Asia Economic Outlook; World Bank; World Gas Intelligence.

COUNTRY OVERVIEW

President: Kim Dae-jung

Independence: August 15, 1945

Population (7/01E): 47.9 million

Location/Size: Eastern Asia/(98,480 square kilometers 38,000 square miles), about the size of Indiana

Major Cities: Seoul (capital), Pusan, Taegu, Incheon, Kwangju

Language: Korean (English widely taught)

Ethnic Groups: Korean, with a small Chinese minority

Religions: Christianity, 49%; Buddhism, 47%; Confucianism, 3%; Other, 1%

Defense (8/98): Army, 548,000; Navy, 60,000; Air Force, 52,000 (plus 35,910 U.S. troops)

ECONOMIC OVERVIEW

Currency: Won (W)

Exchange Rate (10/16/01): US\$1 = 1,296 Won

Real GDP Growth Rate (2000E): 8.8% **(2001E)** 2.2%

Inflation Rate (consumer prices)(2000E): 3.7% **(2001E)** 4.2%

Unemployment Rate (5/00E): 3.6%

External Debt (2001E): \$128.1 billion

Current Account Balance (2001E): \$9.2 billion

Merchandise Exports (2001E): \$179.0 billion

Merchandise Imports (2001E): \$150.5 billion

Merchandise Trade Balance (2001E): \$18.5 billion

Major Exports: Electronics, textiles, ships, automobiles, steel, computers, footwear

Major Imports: Crude oil, food, machinery and transportation equipment, chemicals and chemical products, base metals and articles.

Top Trading Partners: U.S., Japan, China, Germany

ENERGY OVERVIEW

Oil Consumption (2000E): 2.1 million barrels per day (bbl/d); all imported

Crude Oil Refining Capacity (1/1/01): 2.6 million bbl/d

Natural Gas Consumption (1999E): 596 billion cubic feet (bcf)--all imported LNG

Recoverable Coal Reserves (12/31/96): 90 million short tons (Mmst)

Coal Production (1999E): 4.6 Mmst

Coal Consumption (1999E): 65.1 Mmst

Electric Generation Capacity (1/1/99E): 46.4 gigawatts

Electricity Generation (1999E): 250.3 billion kilowatthours

ENVIRONMENTAL OVERVIEW

Minister of Environment: Kim Myung-ja

Total Energy Consumption (1999E): 7.4 quadrillion Btu* (1.9% of world total energy consumption)

Energy-Related Carbon Emissions (1999E): 107.5 million metric tons of carbon (1.7% of world carbon emissions)

Per Capita Energy Consumption (1999E): 156.8 million Btu (vs. U.S. value of 355.8 million Btu)

Per Capita Carbon Emissions (1999E): 2.3 metric tons of carbon (vs. U.S. value of 5.5 metric tons of carbon)

Energy Intensity (1999E): 17,313 Btu/\$1990 (vs U.S. value of 12,638 Btu/\$1990)**

Carbon Intensity (1999E): 0.25 metric tons of carbon/thousand \$1990 (vs U.S. value of 0.19 metric tons/thousand \$1990)**

Sectoral Share of Energy Consumption (1998E): Industrial (55.7%), Transportation (20.2%), Commercial (15.1%), Residential (9.0%)

Sectoral Share of Carbon Emissions (1998E): Industrial (49.8%), Transportation (24.0%), Commercial (17.1%), Residential (9.1%)

Fuel Share of Energy Consumption (1999E): Oil (57.5%), Coal (19.5%), Natural Gas (9.1%)

Fuel Share of Carbon Emissions (1999E): Oil (57.8%), Coal (33.3%), Natural Gas (8.9%)

Renewable Energy Consumption (1998E): 177 trillion Btu* (9% decrease from 1997)

Number of People per Motor Vehicle (1998): 4.4 (vs. U.S. value of 1.3)

Status in Climate Change Negotiations: Non-Annex I country under the United Nations Framework Convention on Climate Change (ratified December 14th, 1993). Signatory to the Kyoto Protocol (signed September 25th, 1998 - not yet ratified).

Major Environmental Issues: Air pollution in large cities; water pollution from the discharge of sewage and industrial effluents; drift net fishing.

Major International Environmental Agreements: A party to the Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands and Whaling. Has signed, but not ratified, Desertification.

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

**GDP based on EIA International Energy Annual 1999

ENERGY INDUSTRY

State Energy Companies: Korea National Oil Corporation(KNOC); Daehan Oil Pipeline Corporation (DOPCO); Korea Electric Power Company (KEPCO); Korea Gas Corporation (KOGAS)

Major Oil Companies (Private): SK Corporation; LG-Caltex; S-Oil (formerly Ssangyong Oil); Hyundai Oil

Major Refineries (1/1/01 Capacity): Ulsan (817,000 bbl/d); Onsan (520,000 bbl/d); Yochon (633,600 bbl/d); Daesan (310,000 bbl/d); Incheon (270,000 bbl/d)

Major Ports: Pusan, Incheon, Kunsan, Mokpo, Ulsan

LNG Regasification Terminals: Pyongtaek, Incheon

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